SOV/20-127-4-27/60

5(4)

AUTHOR: Predvoditelev, A. S., Corresponding Member, AS USSR

TITLE: On the Theory of the Adsorption Wave. Relation Between Concentration of Exhaust Gases and the Time of Fatigue of the Adsorbent

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 4, pp 825-827 (USSR)

ABSTRACT: This article investigates the adsorption wave under consideration of the pressure gradient in the pores (Darsi's law) and the variation in concentration of the reacting substance in the gas current due to physicochemical processes. According to the law by Darsi, the filtration rate is: $W = -\beta \frac{\partial p}{\partial x}$, β denoting the coefficient of resistance of the porous layer. The variation in concentration is represented by the general form: $\frac{\partial c}{\partial t} = \alpha f(c)$. With the introduction of the new variable $\xi = x/t$, the time can be excluded from the two expressions, and an equation can be found which considers, at the same time, the frontal course of the two above-mentioned processes: $W \xi dc = \beta \alpha f(c) dp$ (3).

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On the Theory of the Adsorption Wave. Relation Between Concentration of Exhaust Gases and the Time of Fatigue of the Adsorbent

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By means of this equation, the following special case is investigated: According to Kats (Ref 1), the variation in concentration c is assumed to be of first order: $dc/dt = -\alpha c$; then (3) can be simplified. Integration gives the following result: $W \int \lg \frac{c_d}{c} = \beta \alpha (P - P_d)$, c_d denotes the concentration at the end of the shock tube. From this equation for the beginning of the process, and the assumption of a constant filtration rate, further with $d/\xi = T$ (T = time of fatigue of the adsorption layer, d = thickness of the adsorption layer), an equation is found for T: $c_d = c_0(1+\alpha T)$. c_d corresponds to the concentration of the escaping gas. Figure 4 shows this function for various c_0 in the variable y. Kats also observed the process in a nonlinear reaction. Finally, the example of CO oxidation is discussed (this is a process of zeroth order).
There are 2 figures and 2 Soviet references.

SUBMITTED: March 30, 1959
Card 2/2

PREDVODITELEV, A.S., -

Paper submitted for the [illegible] Combustion [illegible]
2 September, 1960.

4. Following is a list of the Soviet papers submitted to the combustion symposium:

L A Lovachev	The Dependence of Laminar Flame Properties on the Mechanism of Chain Reactions
L A Lovachev	The Theory of Flame Propagation in Systems Involving Branched Chain Reactions
NIKITIN, Ye.Ye	On the Mechanism of Non-Adiabatic Relaxation in Molecular Collisions
I N Denisov K I Shchelkin Ya K Troshin	Some Questions of Analogy Between Combustion in a Thrust Chamber and in a Detonation Wave
K I Shchelkin	On the Criterion of High-Frequency (screaming) Vibrations Generation in a Turbulent Combustion Chamber
A I Sertinov	A Simple Method for Determining Effective Activation Energies for Thermal Decomposition and Spontaneous Ignition of Certain Complex Molecules
L G Bolkhovitinov	On the Theory of Detonation Initiation by Impact
P A Tesner	The Energy of Activation of Gaseous Reactions with Solid Carbon
P A Tesner	Formation of Dispersed Carbon by Explosion and Thermal Decomposition of Acetylene
TESNER, P.A. RAFALKES, I.S. ROBINOVICH, Ye. Ya.	Formation of Dispersed Carbon in Hydrocarbon Diffusion Flames
BAZHANOVA, T.V. ZAYTSEV, S.G.	Effect of Dissociation on the Parameters of Reflected Shock Waves in Carbon Dioxide
ZAYTSEV, S.G. SOLOUKHIN, R.I.	Study of Combustion of Adiabatically Heated Gas Mixture
I N Sunčukov E K Chekalin	Some Methods for Studying Two-Phase Fuel-Air Mixtures in a Flow
E K Chekalin	Propagation of Flame in Turbulent Flow of Two-Phase Fuel-Air Mixture
STUPOCHENKO, Ye. V. SAMUYLOV, Ye. V. PLESHANOV, A.S. ROZHDESTVENSKIY, I.B. STACHENOV, I.P.	Thermodynamic Properties of Air at High Temperatures
A S Predvoditelev	Conditions of Regular Movement of Strong Shocks and Detonation
A S Predvoditelev	Some Remarks on the Regular Movement of Shocks with Spherical and Cylindrical Symmetry
A S Predvoditelev	Regular Motion of Shocks and of Detonation from the Viewpoint of Maxwell's Transfer Equations

PHASE I BOOK EXPLOITATION SOV/4913

Salamandra, Genriyetta Davydovna, Tat'yana Valerianovna Bazhenova, Sergey Grigor'yevich Zaytsev, Pem Ivanovich Soloukhin, Izeya Mikhaylovna Naboko, and Irina Konstantinovna Sevast'yanova.

Nekotoryye metody issledovaniya bystroprotekayushchikh protsessov i ikh primeneniye k izucheniyu formirovaniya detonatsionnoy volny (Some Research Methods for Transient Processes and Their Application to the Study of Detonation-Wave Development) Moscow, Izd-vo AN SSSR, 1960. 91 p. Errata slip inserted. 5,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Energeticheskiy institut imeni G. M. Krzhizhanovskogo.

Resp. Ed.: A. S. Predvoditelev, Corresponding Member, Academy of Sciences USSR.; Ed. of Publishing House: Ya. A. Klimovitskiy; Tech. Ed.: V. Karpov.

PURPOSE: This book is intended for engineers and scientists engaged in developing research techniques and performing experimental

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COVERAGE: The book contains the results of original research on
methods for investigating transient combustion processes and
on the development of detonations under various gasdynamic con-
ditions. The book reviews circuits of spark discharge apparatus
and circuits for synchronizing a series of illuminating flashes
with the process being investigated. Pulse light sources oper-
ating in the regime of frequently repeated flashes are described.
A description is also given of simple apparatus designed by the
authors for obtaining series of Schlieren photographs with a fre-
quency of 50,000 to 100,000 frames per second for exposures of the
order of 10^{-7} sec permitting easy synchronization of the exposure
with any gasdynamic process. The construction is shown and an
analysis is given of the operation of a piezoelectric pressure
transducer which permits reproducing without distortions the
shape of a pressure pulse in the case of gasdynamic disturbances.

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With the aid of the investigation methods developed, a detailed
study was undertaken of the mechanism of a detonation occurring
during propagation of a flame in a tube and of supersonic flow of
gas mixtures capable of reaction in a shock tube. The first
chapter was written by G. D. Salamandra; in it a detailed re-
view of various methods used to produce spark photographs of
transient processes is given. Certain difficulties which had to
be met in the course of the investigations are described and
methods for surmounting them are demonstrated. The second chapter,
written by S. G. Zaytsev, describes methods for measuring rapidly
varying pressures, developed by the Power Engineering Institute of
the Academy of Sciences USSR for investigation of the state of
gas in shock tubes. The methods have found wide application.
The third chapter presents the results of the investigations con-
ducted with the aid of the methods discussed on the mechanism of
the development and propagation of detonation waves under various hy-
drodynamic conditions. These investigations were recently com-
pleted at the laboratory for combustion physics by T. V.
Bazhenovaya, G. D. Salamandra, R. I. Soloukhniy, S. G. Zaytsev,
I. M. Naboko, and I. K. Sevost'yanovaya. Of particular interest

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are those investigations which pertain to the conditions of com-
patibility of the hydrodynamic state of the medium and the chem-
ical process. A. S. Predvoditelev, Professor, Corresponding
Member of the Academy of Sciences USSR, wrote the preface. There
are 79 references: 41 Soviet (3 of which are translations), 22
English, 13 German, and 3 French.

TABLE OF CONTENTS:

PHASE I BOOK EXPLOITATION SOV/4467

Predvoditelev, Aleksandr Savvich, Yevgeniy Vladimirovich Stupochenko, Viktor Pavlovich Ionov, Aleksandr Sergeyevich Pleshanov, Igor' Borisovich Rozhdestvenskiy, and Yevgeniy Vasil'yevich Samuylov

Termodinamicheskiye funktsii vozdukha dlya temperatur ot 1000 do 12,000° K i davleniy ot 0,001 do 1000 atm (grafiki funktsiy) (Thermodynamic Functions of the Air for Temperatures From 1,000 to 12,000° K. and Pressures From 0.001 to 1,000 atm. /Graphs of the Functions/) Moscow, Izd-vo AN SSSR, 1960. 53 p. Errata slip inserted. 2,500 copies printed.

Sponsoring Agencies: Akademiya nauk SSSR. Energeticheskiy institut imeni G.M. Krzhizhanovskogo; Ministerstvo vysshego obrazovaniya SSSR; Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova. Fizicheskiy fakul'tet.

Resp. Ed.: A.S. Predvoditelev, Corresponding Member, Academy of Sciences U SSR.

PURPOSE: This book is intended for scientists and engineers concerned with thermodynamic air functions.

COVERAGE: The publication contains diagrams of thermodynamic air functions plotted as sets of curves in relation to temperature and pressure, where pressure has been taken as parameter. In addition, an approximation method for calculation of the straight shock is described. Universal curves, representing the dependence of the ratio of pressures and enthalpies along the shock on the M number, are given. The diagrams have been plotted using exact data computed by means of an electronic computer at the Vychislitel'nyy tsentr Akademii nauk SSSR (Computing Center, Academy of Sciences USSR). The work presented in this publication was done by scientific workers of the Laboratory of Combustion Physics at the Energeticheskiy institut AN SSSR (Power Engineering Institute, Academy of Sciences USSR), and the Department of Molecular Physics of the Division of Physics at MGU (Moscow State University) under the general direction of Professor A.S. Predvoditelev, Corresponding Member of the Academy of Sciences USSR. There are 3 references, all Soviet.

TABLE OF CONTENTS:

PREDVODITELEV, A.S., prof., otv.red.; ORPIK, S.L., red.izd-va;
GOLUB', S.P., tekhn.red.

[Physical gas dynamics and heat exchange] Fizicheskaia gazodinamika i teploobmen. Moskva, 1960. 112 p. (MIRA 14:6)

1. Akademiya nauk SSSR. Energeticheskiy institut. 2. Chlen-korrespondent AN SSSR (for Predvoditelev).
(Heat--Transmission) (Gas dynamics)

25415
S/137/61/000/006/004/092
A006/A101

11.6100

AUTHOR: Predvoditelev, A.S.

TITLE: On chemical reaction rates in turbulent flows

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 6, 1961, 1-2, abstract 6B5 (V sb. "3-ye Vses. soveshchaniye po teorii goreniya, v. 1", Moscow, 1960, 138 - 159)

TEXT: The author derived a basic formula for the rate of chemical reactions in a turbulent flow, on the basis of general regularities of mass phenomena found in mathematical statistics. Data obtained were compared with results of investigations made by V.N. Iyevlev on methane combustion in industrial torches. It was found that the state of the flow affected substantially the kinetics of chemical reactions. It is therefore absolutely necessary that this kinetics be studied and the hydrodynamical conditions of the medium be taken into account.

N. Ivanov

[Abstracter's note: Complete translation]

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25747
S/123/61/000/012/040/042
A004/A101

10.1410 1327 2207 9901

AUTHOR: Predvoditelev, A. S.

TITLE: On the conditions of regular motion of strong shock wave discontinuities and detonation

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 12, 1961, 23, abstract 12I184 (V sb. "3-ye Vses. soveshchahniye po teorii goreniya. v. 1". Moscow, 1960, 178-186)

TEXT: The author investigates the problem of finding the conditions of uniform motion shock wave discontinuities by the Zhuge [Abstracter's note: transliteration from Russian] method. It is emphasized that a regular motion in a medium at rest does not mean that there are no accelerations and velocity gradients of the medium. On the contrary, a regular motion of the shock front is effected in such a way that the acceleration of the medium is compensated for in a definite manner by the gradient of its velocity.

V. Kislykh

[Abstracter's note: Complete translation]

Card 1/1

PREDVODITELEV, A. S.

PHASE I BOOK EXPLOITATION

Golitsyn, Boris Borisovich, Academician (Deceased)

Izbrannyye trudy. t. 1: Fizika (Selected Works. v. 1: Physics) Moscow, Izd-vo AN SSSR, 1960. 241 p. 4,500 copies printed.

Sponsoring Agency: Akademiya nauk SSSR.

Editorial Board: Resp. Ed. of v. 1: A. S. Predvoditelev, Corresponding Member, Academy of Sciences USSR; Resp. Ed. of v. 2: V. F. Bochkovskiy, Professor; G. P. Gorshkov, Professor, D. P. Kirnos, Professor, Ye. F. Savarenskiy, Professor; Candidates of Physical and Mathematical Sciences: A. V. Vvedenskaya, N. V. Veshnyakov, A. Ya. Levitskaya, N. A. Linden, L. P. Filippov and D. A. Kharin; Ed. of Publishing House: D. M. Alekseyev; Tech. Ed.: S. G. Markovich.

PURPOSE: This book is intended for physicists.

COVERAGE: This is the first of a two-volume work containing selected works of Academician Prince B. B. Golitsyn (1862-1916). Volume I

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Selected Works (Cont.)

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presents Golitsyn's contributions to physics, while the second volume will present his works in seismology. The volume contains an early work of the author on mathematical physics, the importance of which lies in his broad interpretation of the concept of temperature. Other articles in the collection deal with the critical condition of matter, optics, and the determination of the density of saturated vapors. A short biographical sketch of the author is provided. An appendix lists the high points of his scientific career. No personalities are mentioned. References accompany individual works.

TABLE OF CONTENTS:

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GOLITSYN, Boris Borisovich, akademik; BONCHKOVSKIY, V.F., prof., otv.red.II toma; PREDVODITELEV, A.S., otv.red.I toma; GORSHKOV, G.P., prof., red.; KIRNOS, D.P., prof., red.; SAVARENSKIY, Ye.F., prof., red.; VVEDENSKAYA, A.V., kand.nauk, red.; VESHNYAKOV, N.V., kand.nauk, red.; LEVITSKAYA, A.Y., kand.nauk, red.; LINDEN, N.A., kand.nauk, red.; FILIPPOV, L.P., kand.nauk, red.; KHARIN, D.A., kand.nauk, red.; ALEKSEYEV, D.M., red.izd-va; KASHINA, P.S., tekhn.red.

[Selected works] Izbrannye trudy. Moskva, Izd-vo Akad.nauk SSSR. Vol.2. [Seismology] Seismologiia. 1960. 489 p.

(MIRA 13:12)

1. Chlen-korrespondent AN SSSR (for Predvoditelev).
(Seismology)

PREDVODITELEV, A.S.

Comment on A.V.Lykov and IU.A.Mikhailov's book "Theory of energy and mass transfer." Izv.vys.ucheb.zav.;energ. 3 no.10:114 O '60. (MIRA 13:11)

1. Chlen-korrespondent AN SSSR.
(Mass transfer) (Heat--Transmission) (Lykov, A.V.)
(Mikhailov, IU.A.)

S/170/60/003/010/021/023
B019/B054

AUTHOR: Predvoditelev, A. S., Corresponding Member of the AS USSR, Professor

TITLE: V. A. Mikhel'son - a Founder of Combustion Physics in Russia (On His 100th Birthday)

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1960, Vol. 3, No. 10, pp. 135-139

TEXT: On June 27, 1960, V. A. Mikhel'son would have been 100 years old. One of his most important investigations was the study of the inflammation of detonating gas mixtures. His papers on combustion and explosion physics were collected in a monograph which was submitted as a thesis for the degree of Master of Physics at the Moskovskiy universitet (Moscow University). The present article tries to show that Mikhel'son's ideas are still valid today. It discusses results of investigations in combustion physics which he carried out at the Institute of Physics of Berlin University, and which were judged by Helmholtz and Kundt. On the basis of experimental results, he gave in his thesis a theoretical explanation for the propagation rate of the combustion front in vario

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V. A. Mikhel'son - a Founder of Combustion Physics in Russia (On His 100th Birthday)

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detonating gases as it was correct for his days. Mikhel'son was the first to perceive that in the investigation of flame propagation not only the heat conduction equation but also the equation for the kinetics of the chemical reaction must be taken into account. On the basis of this concept, some formulas are obtained for the velocity of the combustion front. Among his experimental results, it is particularly pointed out that he was able to prove that the flame propagation rate, as a function of the mixing ratio of the detonating gas, has an upper and a lower limit. Further, this propagation rate has a maximum in dependence on the mixing ratio. Zel'dovich and Frank-Kamenetskiy are mentioned.

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S/170/60/003/011/001/016
B019/B056

11.6200

AUTHOR: Predvoditelev, A. S.

TITLE: The Rates of Chemical Reactions in Turbulent Flows/ (Fundamentals of the Theory)

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1960, Vol. 3, No. 11, pp. 3-10

TEXT: By means of methods of mathematical statistics, the author derives a formula for the kinetics of homogeneous chemical reactions occurring in turbulent flows. In the first part he defines and explains the regression line and the correlation coefficient in the correlation field in the sense of statistics. In the second part, the distribution function of a statistical system with two characteristics is set up and discussed. It is found that, if the distribution function has the form

$$Z = \frac{N}{2\pi\sigma_x\sigma_y\sqrt{1-r^2}} \exp\left[-\frac{1}{2(1-r^2)}\left\{\frac{x^2}{\sigma_x^2} - \frac{2rxy}{\sigma_x\sigma_y} + \frac{y^2}{\sigma_y^2}\right\}\right] \qquad (2),$$

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The Rates of Chemical Reactions in Turbulent Flows (Fundamentals of the Theory) S/170/60/003/011/001/016 B019/B056

the regression lines are straight and vice versa. In the third part the statistical conclusions are then drawn from what has hitherto been developed and applied to chemical reactions in turbulent flows. It is found that the correlation coefficient for the rates of chemical reactions is equal to that of a turbulent flow. In the last part, a basic formula is set up for the rate of a chemical reaction:

$\frac{dc}{dt} \approx \sqrt{\left(\overline{\frac{\partial c}{\partial t}}\right)_1 \left(\overline{\frac{\partial c}{\partial t}}\right)_2}$ which leads to $\frac{dc}{dr} = r \frac{\partial c}{\partial t}$. Thus, the author was able to show that the correlation coefficient of the rates of chemical reactions taking place in a turbulent flow is equal to the correlation coefficient of the turbulent flow. There are 1 figure and 2 Soviet references.

ASSOCIATION: Gosudarstvennyy universitet im. M. V. Lomonosova, g. Moskva (State University imeni M. V. Lomonosov, Moscow)

SUBMITTED: June 21, 1960

Card 2/2

S/124/61/[illegible]
D237/D305

11,7350

AUTHOR: Predvoditelev, A.S.

TITLE: On the combustion of spherical particles

PERIODICAL: Referativnyy zhurnal, Mekhanika, no. 11, 1961, 104, abstract 11B693 (Pratsi Odes'k. un-tu. Ser. Fiz. n., 1960, 150, no. 7, 9 - 14)

TEXT: Theoretical analysis of combustion of a drop of liquid fuel is performed on the assumption that it can be considered as a surface phenomenon analogically to evaporation which was investigated in the author's former article (Pratsi Odes'k. un-tu Ser. fiz. n., 1960, 150, no. 7, 97 - 109). For small stream velocities when the combustion front is near the surface of the drop, the surface area is linearly dependent on time (Sreznevskiy Law) and has been confirmed experimentally for both one-component and multi-component fuels. The Sreznevskiy law is true also in case of spherical particles of solid fuel if the angle of disruption is constant, otherwise the linearity between the square of the diameter and time is no longer true. [Abstractor's note: Complete translation]

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32382
S/124/61/000/012/026/038
D237/D304

11 7200

AUTHORS: Predvoditelev, A. S., and Sundukov, I. N.

TITLE: On flame propagation in two-phase mixtures

PERIODICAL: Referativnyy zhurnal, Mekhanika, no. 12, 1961, 100, abstract 12B699 (Tr. Odessk. un-ta, Ser. Fiz. n., 1960, 150, no. 7, 45-54)

TEXT: The combustion of a two-phase system of vapors and droplets is investigated both theoretically and experimentally. One of the theoretically possible mechanisms of two-phase combustion in the conditions prevailing in the combustion chamber of an engine is considered. Assuming the mode of frontal combustion, the authors generalize complementary information on the formation and motion of combustion front. Experiments were performed in a special burner-atomizer. The percentage of liquid phase was determined from the number and size of droplet marks on the layer of soot deposited on the glass plate. The

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velocity of flame propagation was determined from the angle of the photographed flame jets by means of the formula $g = W\sin\varphi/2$, where W = mean velocity of the flow of mixture, and φ = interior angle of the flame jet. Relationships were obtained of the velocity of flame propagation g and general factor of air excess α for proportions of liquid phase in the total amount of fuel ranging from 0% (homogeneous mixture) to 60%. The experiment shows the strong influence of the presence of a liquid phase in a burning mixture on the velocity of flame propagation. During the theoretical investigation, a series of formulas was obtained for the velocity of propagation of the flame front which was assumed to consist of a front of conflagration and where the ratio of infinitesimal increments of the normal to the surface and of time was taken as the velocity of front propagation for the mean distance between the droplets. etc. It is argued that the combustion of a two-phase mixture can be considered as a chemical reaction of the 2nd order with respect to the coefficient of air excess. The possibility is

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On flame propagation...

shown of the extension of the formulas obtained to the case of turbulent combustion of homogeneous mixtures where the part of the droplets can be played by gas clusters in random motion, and it is noted that detailed knowledge of chemical kinetics is not necessary in this case. [Abstracter's note: Complete translation.]

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28307
S/081/61/000/016/014/040
B118/B101

11.7200

AUTHOR: Predvoditelev, A. S.

TITLE: Velocity of displacement and propagation of the combustion front in two-phase systems

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 16, 1961, 64, abstract 16B451 (Tr. Odessk. un-ta. Ser. fiz. n. 150, no. 7, 1960, 75-83)

TEXT: For the purpose of determining the normal transport velocity, g, of the flame front of a two-phase mixture, the author used the heat-conduction equation and Sreznevskiy's law in the integral form $S = At + S_0$, where S_0 and S are the initial and the time-dependent surface of the drop, A is a constant, and t is the time. If the flame front is represented as a shock front, the square of the transport velocity is given by $g_2 = aA\varphi(\alpha)/\left[ABg + S_0\varphi(\alpha)\right]$, where a is the thermal diffusivity of the medium,

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Velocity of displacement and...

$\varphi(\alpha)$ is the reaction rate, α is the air-excess coefficient, and B is a constant equal to da/dg. [Abstracter's note: Complete translation.]

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S/124/61/000/012/028/038
D237/D304

11,9350

AUTHOR: Predvoditelev, A. S.

TITLE: On the process of frontal evaporation and sublimation of spherical particles

PERIODICAL: Referativnyy zhurnal, Mekhanika, no. 12, 1961, 106, abstract 12B740 (Tr. Odessk. un-ta, Ser. fiz. n., 1960, 150, no. 7, 97-109)

TEXT: Simultaneous consideration of equations of heat conductivity and of the kinetics of evaporation of a drop makes it possible to find the conditions for which a process of frontal evaporation or sublimation takes place. This will take place when the surface of evaporation coincides with the isotherm. It is shown that on the frontal mode of development of the process with constant temperature of the drop the velocity of displacement of surface of evaporation is constant (Sreznevskiy Law). Results obtained by the author for a stationary

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On the process of...

S/124/61/000/012/028/038
D237/D304

drop are extended to the case of evaporation in a stream. Investigating the experimental results of various workers lead the author to the concluding remark on the possibility of the frontal change of phase. [Abstracter's note: Complete translation.]

VB

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S/081/62/000/001/006/007
B156/B101

17359

AUTHOR: Predvoditelev, A. S.

TITLE: Combustion of spherical particles

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 1, 1962, 69, abstract 1B502 (Tr. Odessk. un-ta. Ser. fiz. n., v. 150, no. 7, 1960, 9-14)

TEXT: The law, earlier found theoretically by the author (RZhKhim., 1961, 22B332), for the combustion of droplets in a flow in the case of the partial extinction of a flame, is analyzed. With the angle of extinction (the angle within which the flame zone lies) constant, the law of Sreznevskiy is fulfilled: that the droplet surface is proportional to time. During the combustion of spherical particles of carbon, the rate of combustion is depicted by the constant $k_s = -(1/F)(dM/dt)$, where M is the weight of the particle, F its surface area, and t time. According to the results of several experiments, $k_s \sim -1/r$, where r is the radius of the particle, this indicating

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that the law of Sreznevskiy is also followed in this case. In a number of other experiments $k_s = -1/r$, the law of Sreznevskiy therefore not being followed; this may be due to variation, during combustion, in the angle of extinction. The author conjectures that the combustion of droplets of fuel in a turbulent two-phase mixture flow follows the pattern proposed.
[Abstracter's note: Complete translation.]

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S/124/62/000/009/019/026
A001/A101

11.6300

AUTHOR: Predvoditelev, A. S.

TITLE: On rates of chemical reactions in turbulent flows

PERIODICAL: Referativnyy zhurnal, Mekhanika, no. 9, 1962, 82, abstract 9B572 (In collection: "3-ye Vses. soveshchaniye po teorii goreniya, v. 1", Moscow, 1960, 138 - 159).

TEXT: The author investigates the effect of hydrodynamic factors on kinetics of chemical transformations under conditions of turbulent flows. The problem is analyzed on the basis of general regularities of mass-scale phenomena established in mathematical statistics. It is one of the possible viewpoints on chemical processes in hydrodynamic flows. The method of calculating such processes is developed. It is assumed that the rate of a chemical process is a single-valued and fully determined function of components of pulsation speed of a turbulent flow, and that the values of pulsation speed components obey the normal distribution if the flow is in a steady-state. The problem of calculating the measured turbulent rate of a chemical transformation is reduced to calculating the coefficient of

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S/124/62/000/009/019/026
A001/A101

On rates of chemical reactions in turbulent flows

correlation between the turbulent flow and some quantity which is similar to analytical relations of chemical kinetics. A particular case of the flow is considered in which chemical transformations are going on, when a gas jet flows out of a round aperture into a free space. The correlation coefficient is calculated for this case. Theoretical conclusions are compared with the data obtained from experiments of burning methane in industrial burners. It is concluded that the state of a flow affects considerably the kinetics of chemical reactions.

S. S. Kvashnina

[Abstracter's note: Complete translation]

Card 2/2

PREDVODITELEV, A.S.

Nature of heat motion in liquids. Part 3. Inzh.-fiz.zhur. 4 no.8:3-9 Ag '61. (MIRA 14:8)

1. Gosudarstvennyy universitet imeni M.V.Lomonosova, Moskva.
(Heat--Conduction) (Hydrodynamics)

PREDVODITELEV, A.

[illegible] (LE 14:11)
(Lomonosov, Mikhail Vasil'evich, 1711--1765)

PREDVODITELEV, A. S.

"On Heat Transfer Problems in a Supersonic Flow."

Report submitted for the Conference on Heat and Mass Transfer, Minsk, BSSR, June 1961.

PREDVODITELEV, A.S.; ATENKOV, S., tekhn. red.

[Aerodynamics of rarefied gases and heat-transfer problems; Conference on Heat and Mass Transfer, Minsk, January 23-27, 1961] Ob aerodinamike razrezhennykh gazov i zadachakh teploobmena; soveshchanie po teplo- massoobmenu, g. Minsk, 23-27 ianvaria 1961 g. Minsk, 1961. 24 p. (MIRA 15:2)
(Aerodynamics) (Heat—Transmission)

PREDVODITELEV, A. S.

PHASE I BOOK EXPLOITATION SOV/5698

Akademiya nauk SSSR. Energeticheskiy institut.

Fizicheskaya gazodinamika i teploobmen (Physical Gas Dynamics and Heat Exchange) Moscow, 1961. 112 p. Errata slip inserted. 4,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Energeticheskiy institut im. G. M. Krzhizhanovskogo.

Resp. Ed.: A. S. Predvoditelev, Corresponding Member, Academy of Sciences USSR; Ed. of Publishing House: S. L. Orpik; Tech. Ed.: S. P. Golub'.

PURPOSE : This book is intended for engineers and scientific workers interested in supersonic flow of gases, aerodynamic heat phenomena, and the dissociation of gases.

COVERAGE: This collection consists of 15 papers written at the Laboratoriya fiziki goreniya Energeticheskogo instituta Akademii

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nauk SSSR (Laboratory of Combustion Physics of the Power Institute of the Academy of Science USSR) on investigations on the physics of gas dynamics and phenomena of heat exchange in supersonic flows. In the field of physical gas dynamics motions of the medium with possible transformations of the substance, not excluding such processes as the thermal ionization of molecules and atoms, are discussed. No personalities are mentioned. References follow most of the articles.

TABLE OF CONTENTS:

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KUDRYAVTSEV, Yevgeniy Vasil'yevich; CHAKALEV, Konstantin Nikolayevich; SHUMAKOV, Nikolay Vasil'yevich; PREDVODITELEV, A.S., otv. red.; GORSHKOV, G.B., red. izd-va; YEPIFANOVA, L.V., tekhn. red.

[Nonstationary heat exchange] Nestatsionarnyi teploobmen. Moskva, Izd-vo Akad.nauk SSSR, 1961. 156 p. (MIRA 14:12)

1. Chlen-korrespondent AN SSSR (for Predvoditelev).
(Heat—Transmission)

SHAULOV, Yukhanan Khaimovich; LERNER, Moisey Ovseyevich. Prinimal uchastiye PREDVODITELEV, A.S., prof.; KOROBOV, V.V., kand. khim. nauk, red.; SHEYNFAYN, L.I., red. izd-va; ROZHIN, V.P., tekhn. red.

[Combustion in liquid propellant rocket engines] Gorenie v zhidkostnykh raketnykh dvigateliakh. Moskva, Gos. nauchno-tekhn. izd-vo Oborongiz, 1961. 194 p. (MIRA 14:10)

1.Chlen-korrespondent AN SSSR (for Predvoditelev).
(Liquid propellant rockets) (Combustion)

PREDVODITELEV, A.S.; LAVROV, N.V., doktor tekhn. nauk, prof.; AL'T-SHULER, V.S., doktor tekhn. nauk; POPOV, V.M., kand. tekhn. nauk; TSEYTLIN, B.S., red. izd-va; PRUSAKOVA, T.A., tekhn. red.; RYLINA, Yu.V., tekhn. red.

[Fuel gases in the national economy; work of the All-Union Conference] Ispol'zovanie goriuchikh gazov v narodnom khoziaistve; trudy Vsesoiuznogo soveshchaniia. Moskva, 1961. 266 p. (MIRZ 14:5)

1. Akademiya nauk SSSR. Institut goriuchikh iskopayemykh. 2. Chlen-korrespondent AN SSSR (for Predvoditelev) 3. Institut goryuchikh iskopayemykh AN SSSR (for Lavrov, Popov)
(Gas as fuel--Congresses)

KIBARDIN, Yu.A.; KUZNETSOV, S.I.; LYUBIMOV, A.N.; SHUMYATSKIY, B.Ya.; PREDVODITELEV, A.S., red.; MELEYEV, A.S., red.; BORUNOV, N.I., tekhn. red.

[Atlas of the dynamic functions of gas under conditions of high velocities and high temperature of the air flow] Atlas gazodinamicheskikh funktsii pri bol'shikh skorostiakh i vysokikh temperaturakh vozdushnogo potoka. Pod red. A.S.Predvoditelia. Moskva, Gos. energ. izd-vo, 1961. 327 p. (MIRA 14:10)

1. Chlen-korrespondent AN SSSR (for Predvoditelev).
(Gas dynamics)

ARBUZOV, A.Ye., akad.; VAVILOV, S.I., akad.; VOL'FKOVICH, S.I., akad.; KOCHINA, P.Ya., akad.; LANDSBERG, G.S., akad.; LEYBENZON, L.S., akad.; PORAY-KOSHITS, A.Ye., akad.; SMIRNOV, V.I., akad.; FESENKOV, V.G., akad.; CHERNYAYEV, V.I., akad.; KAPUSTINSKIY, A.F.; KORSHAK, V.V.; KRAVKOV, S.V.; NIKIFOROV, P.M.; PETROV, A.D.; PREDVODITELEV, A.S.; FRISH, S.E.; CHETAYEV, N.G.; CHMUTOV, V.K.; SHOSTAKOVSKIY, M.F.; KUZNETSOV, I.V., red.; MIKULINSKIY, S.R., red.; MURASHOVA, N.Ya., tekhn.red.

[Men of Russian science; essays on prominent persons in natural science and technology: Mathematics, mechanics, astronomy, physics, chemistry] Liudi russkoi nauki; ocherki o vydaiushchikhsia deiateliakh estestvoznaniia i tekhniki: matematika, mekhanika, astronomiia, fizika, khimiia. Moskva, Gos. izd-vo fiziko-matem. lit-ry, 1961. 599 p. (MIRA 14:10)

1. Chleny-korrespondenty AN SSSR (for Kapustinskiy, Korshak, Kravkov, Nikiforov, Petrov, Predvoditelev, Frish, Chetayev, Chmutov, Shostakovskiy). (Scientists)

PREDVODITELEV, A.S.

Scattering of longitudinal and transverse waves in liquid relaxation media. Part 1. Vest. Mosk. un. Ser. 3: Fiz., astron. 16 no.3:10-18 My-Je '61. (MIRA 14:7)

1. Kafedra molekulyarnoy fiziki Moskovskogo gosudarstvennogo universiteta.

(Waves) (Hydrodynamics)

11.6300

AUTHOR: Predvoditelev, A. S.

TITLE: II. Rates of Chemical Reactions in Turbulent Flows

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1961, Vol. 4, No. 1, pp. 14-21

TEXT: The author derives an expression for the rate of chemical processes in turbulent flows, which enter the free space through round openings. In this, he bases upon fundamental relations, which were given by Prandtl on the strains in an axially symmetric flow. Furthermore, the author, together with Ye. V. Stupochenko, in voluminous experiments obtained the following empirical relation for the rate distribution W_x along the radius: $W_x = (A/x)\exp(-cR^2/x^2)$ (1). This relation was checked and approved at the Vsesoyuznyy teplotekhnicheskiy institut (All-Union Institute of Thermal Engineering). It is (1) analyzed from the viewpoint of the Reynolds equation. It is shown that ε is nearly constant in linear flows. On these suppositions, the following differential equation

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B019/B056

II. Rates of Chemical Reactions in Turbulent Flows

for the reaction rate is obtained: $dc/dt = \frac{9c}{L^2}(x-L)^2 \frac{c}{\tau}$ (5)

Experiments were made on methane-air mixtures in a tube-shaped burner for comparing experimental and theoretical results. Thus it was possible to prevent the access of air from the space surrounding the flame. The concentration distribution of the combustion products and the velocity distributions in the burner tube were investigated. A typical distribution of these quantities is graphically represented in Fig. 1. For the velocity, the empirical formula

$$W = U(x, r) + \frac{A}{x}\exp(-\alpha(r/x)^2)$$ is derived, and basing upon the usual scheme of the gas discharge from a round opening, the expression $\alpha = \beta_0 W_0^{1/2} d^{-1.5n}$ is obtained, where β_0 is a function of the ratio between the diameters of the nozzle and the nozzle crater. Finally, the relation

$$c = c_0\{1 - \exp(-d^{1.5(1.67-n)} K_1 f(\ ) x^{1.5}/3W_0^{0.64})\}$$ (11)

is obtained by referring to V. N. Iyevlev. Here d is the nozzle radius,

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II. Rates of Chemical Reactions in Turbulent Flows

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$x' = x-L$, $f(x)$ gives the dependence of the reaction rate on the excess of air. The dependence of the coefficient K on the initial flow velocity W_o was experimentally determined, and already Iyevlev has given a relation, which is in good agreement with experimental values. Experimental checking of (11) showed good agreement with theory. In the discussion of the results obtained it is further said that an investigation of the kinetics of the chemical reaction in consideration of the hydrodynamic state of the medium must still be carried out. There are 4 figures, 1 table, and 3 Soviet references.

ASSOCIATION: Gosudarstvennyy universitet im. M. V. Lomonosova, g. Moskva (State University imeni M. V. Lomonosov, Moscow)

SUBMITTED: June 18, 1960

Legend to Fig. 1: Typical distribution of the flow velocity expressed in m/sec.

PREDVODITELEV, A.S.

Nature of the thermal motion in fluids. Inzh.-fiz. zhur. 4 no.6:3-12 Je '61. (MIRA 14:7)

1. Gosudarstvennyy universitet imeni M.V. Lomonosova, Moskva.
(Heat--Convection)

PREDVODITELEV, A.S.

Nature of the movement of heat in fluids. Part 2. Inzh.fiz.zhur. 4 no.7:3-10 Jl '61. (MIRA 14:8)

1. Gosudarstvennyy universitet imeni M.V.Lomonosova, Moskva.
(Heat--Transmission) (Fluid dynamics)

S/081/62/000/006/020/117
B166/B101

11.8200

AUTHOR: Predvoditelev, A. S.

TITLE: Conditions of regular motion of strongshock explosions and detonations

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 6, 1962, 57, abstract 6B389 (Sb. "Fiz. gazodinamika i teploobmen". M., AN SSSR, 1961, 5-14)

TEXT: A mathematical study of the conditions of regularity (stability in Jouguet's terminology) of the motion of shock and detonation waves. [Abstracter's note: Complete translation.]

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Card 1/1

S/081/62/000/008/006/057
B166/B101

AUTHOR: Predvoditelev, A. S.

TITLE: The dispersion of sound waves in rarefied gases. Article 2

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 8, 1962, 39, abstract 8B263 (Sb. "Primeneniye ul'traakust. k issled. veshchestva". M., no. 12, 1960, 13-29)

TEXT: A critical review. Various theories, mainly Barnett's, of the propagation of ultrasound in gases are examined, as well as methods and the results of checking them. For the article see RZhKhim, 1960, no. 19, 60442. [Abstracter's note: Complete translation.]

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PREDVODITELEV, A.S.

M.V.Lomonosov's works on the structure of matter and the theory of heat. Vop.ist.est.i tekh. no.12:93-100 '62. (MIRA 15:4)
(Lomonosov, Mikhail Vasil'evich, 1711-1765)
(Matter--Constitution) (Heat)

PREDVODITELEV, A.S.; STUPOCHENKO, Ye.V.; ROZHDESTVENSKIY, I.B.; SAMUYLOV, Ye.V.; PLESHANOV, A.S.; ORLOVA, I.A., red.; KORKINA, A.I., tekhn. red.

[Tables of the gas dynamic and thermodynamic values of an air flow behind a direct shock wave for velocities of the incident wave up to 4500 m/sec.] Tablitsy gazodinamicheskikh i termodinamicheskikh velichin potoka vozdukha za priamym skachkom uplotneniia; dlia skorostei nabegaiushchego potoka do 4500 m/sek. Moskva, Vychislitel'nyi tsentr AN SSSR, 1962. 131 p. (MIRA 16:4)

1. Chlen-korrespondent Akademii nauk SSSR (for Predvoditlev).
(Air flow)

PREDVODITELEV, A.S., prof.; STUPOCHENKO, Ye.V.; PLESHANOV, A.S.; SAMUYLOV, Ye.V.; ROZHDESTVENSKIY, I.B.; ORLOVA, I.A., red.; POPOVA, N.S., tekhn. red.

[Tables of the thermodynamic functions of air for temperatures from 200° to 6000°K and pressures from 0.00001 to 100 atm.]Tablitsy termodinamicheskikh funktsii vozdukha; dlia temperatur ot 200°do 6000°K i davlenii ot 0,00001 do 100 atmosfer. Moskva, Akad. nauk SSSR. Vychislitel'nyi tsentr, 1962. 267 p.
(MIRA 15:12)

(Air--Thermodynamic properties)
(Physics--Tables, etc.)

PREDVODITELEV, A.S., otv. red. ; BANKVITSER, A.L., red. izd-va; GORSHKOV, G.B., red.izd-va; VOLKOVA, V.G., tekhn. red.

[Physical gas dynamics, heat transfer, and the thermodynamics of gases at high temperatures]Fizicheskaia gazodinamika, teploobmen i termodinamika gazov vysokikh temperatur. Moskva, Izd-vo Akad. nauk SSSR, 1962. 311 p. (MIRA 15:12)

1. Moscow. Energeticheskiy institut. 2. Chlen-korrespondent Akademii nauk SSSR (for Predvoditelev).
(Gas dynamics) (Heat--Transmission)
(Gases at high temperatures)

S/885/62/000/000/013/035
D234/D308

AUTHOR: Predvoditelev, A. S.

TITLE: A contradiction in Zhuge's theory of regular motion of shock discontinuities with spherical and cylindrical symmetry

SOURCE: Akademiya nauk SSSR. Energeticheskiy institut. Fizicheskaya gazodinamika, teploobmen i termodinamika gazov vysokikh temperatur. Moscow, Izd-vo AN SSSR, 1962, 140-144

TEXT: The author refers to one of the four Zhuge equations for spherical or cylindrical symmetry, obtained in his previous paper and reduces it to

$$(\eta_2^2 - c_2^2)\frac{dv_2}{dt} + v_2^2\frac{\partial p_2}{\partial S_2}\frac{dS_2}{dt} = \eta_2^2 w_{2n}\frac{v_{2n}}{r} \qquad (4)$$

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for regular motion. This is found to be inconsistent with the Chapman-(Zhuge) rule except that when the specific volume gradient behind the shock discontinuity is infinite. The author then assumes that the condition $dS_2/dt = 0$ is not valid and deduces

$$\frac{dS_2}{at} = \frac{nc_p W_{2n}}{r} \qquad (5)$$

from (4). On this basis the Chapman-Zhuge rule is generalized:

$$\vartheta_2 = C_2;\ \Delta S_2 = \frac{A(1+n)}{mr^n} \qquad (8)$$

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S/885/62/000/000/014/035
D234/D308

AUTHOR: Predvoditelev, A. S.

TITLE: Molecular-kinetic aspect of the first Chapman-Zhuge rule

SOURCE: Akademiya nauk SSSR. Energeticheskiy institut. Fizicheskaya gazodinamika, teploobmen i termodinamika gazov vysokikh temperatur. Moscow, Izd-vo AN SSR, 1962, 145-152

TEXT: Using Maxwell's general equation of quality transport, the author deduces that the mean component of thermal velocity u_n' must be equal to

$$u_n' = \Pi (1 - \beta) \qquad (12a)$$

where β is the coefficient of chemical reaction. The first Chapman-Zhuge rule can be obtained only if $\beta = 0$. The relation (12a) can be used for determining β behind the shock front by measuring the

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1

Molecular-kinetic aspect ... S/885/62/000/000/014/035
D234/D308

relative velocity of the front and the velocity of the front and the velocity of sound behind it.

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S/885/62/000/000/015/035
D234/D308

AUTHOR: Predvoditelev, A. S.

TITLE: Laws of conservation at the shock wave front

SOURCE: Akademiya nauk SSSR. Energeticheskiy institut. Fizicheskaya gazodinamika, teploobmen i termodinamika gazov vysokikh temperatur. Moscow, Izd-vo AN SSSR, 1962, 153-158

TEXT: Using the definition of the wave front as a locus of characteristics (the same collection, 145-152) the author derives

$$\rho(g_\xi - W_n) = \rho\mathcal{B} = \text{const} \qquad (2)$$

for the conservation of mass,

$$\rho\mathcal{B}^2 + p - p_{1n} = \text{const} \qquad (9a)$$

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Laws of conservation ... S/885/62/000/000/015/035
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for the conservation of momentum, and

$$P_n W_n + \rho \mathfrak{J} \left(\bar{\Phi} - \frac{W_n^2}{2} - U \right) + \int P_{1n} dW_n - q_n = \text{const} \qquad (16)$$

$$\rho \mathfrak{J} \left(\bar{\Phi} + \frac{\Pi^2}{2} - B_v - U \right) + \int P_{1n} dW_n - q = \text{const} \qquad (16a)$$

for the conservation of energy. $P_n = p - p_{1n}$ is the normal tensor of viscous stress.

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STREL'TSOV, V.V.; SHCHUKIN, V.K.; REBROV, A.K.; FUKS, G.I.; KUTATELADZE, S.S.; LYKOV, A.V.; PREDVODITELEV, A.S.; KONAKOV, P.K.; DUSHCHENKO, V.P.; MAKSIMOV, G.A.; KRASNIKOV, V.V.

Readers' response to I.T. El'perin's article "Terminology of heat and mass transfer" in IFZh No.1, 1961. Inzh.-fiz. zhur. 5 no.7:113-133 Jl '62. (MIRA 15:7)

1. Khimiko-tekhnologicheskiy institut, g. Ivanovo (for Strel'tsov). 2. Aviatsionnyy institut, Kazan' (for Shchukin, Rebrov). 3. Politekhnicheskiy institut, Tomsk (for Fuks). 4. Institut teplofiziki Sibirskogo otdeleniya AN SSSR, Novosibirsk (for Kutateladze). 5. Energeticheskiy institut AN BSSR, Minsk (for Lykov). 6. Gosudarstvennyy universitet imeni Lomonosova, Moskva (for Predvoditelev). 7. Institut inzhenerov zheleznodorozhnogo transporta, Moskva (for Konakov). 8. Institut legkoy promyshlennosti, Kiyev (for Dushchenko). 9. Vsesoyuznyy zaochnyy institut pishchevoy promyshlennosti, Moskva (for Maksimov). 10. Tekhnologicheskiy institut pishchevoy promyshlennosti, Moskva (for Krasnikov).

(Heat—Transmission) (Mass transfer)

PREDVODITELEV, A.S.

Problem of the equation of state of condensed media. Theoretical part. Inzh.-fiz.zhur. 5 no.8:108-129 Ag '62. (MIRA 15:11)

1. Gosudarstvennyy universitet imeni Lomonosova, Moskva.
(Equation of state) (Mathematical statistics)

SAMUYLOV, Ye.V.; OLEVINSKIY, K.K.; PREDVODITELEV, A.S., prof., otv. red.; ORLOVA, I.A., red.; KORKINA, A.I., tekhn. red.

[Tables of sums for calculating the thermodynamic properties of gases] Tablitsy summ dlia rascheta termodinamicheskikh svoistv gazov. Moskva, Vychislitel'nyi tsentr AN SSSR, 1963. 144 p. (MIRA 17:3)

1. Chlen-korrespondent AN SSSR (for Predvoditelev).

VERKHUNOV, Vitaliy Mikhaylovich; PREDVODITELEV, A.S., prof., red.; KUSURGASHEV, I.M., red.; SEMENOV, Yu.P., tekhn. red.; ANTRALOVA, L.I., tekhn. red.

[History of physics at Kazan University] Istoriia fiziki v Kazanskom universitete. Kazan', 1963. 358 p. (MIRA 16:8)

1. Chlen-korrespondent AN SSSR (for Predvoditelev).
(Kazan--Physics--Research)

L 14400-63 EPF(c)/EWT(1)/EPF(n)-2/EWP(q)/EWT(m)/BDS AFFTC/ASD/SSD

Pu-4 JD/JW

ACCESSION NR: AP3003048 S/0170/63/000/006/0054/0060

64
63

AUTHOR: Predvoditelev, A. S. (Moscow)

TITLE: Equation of state for helium

SOURCE: Inzhenerno-fizicheskiy zhurnal, no. 6, 1963, 54-60

TOPIC TAGS: helium, state equation, He

ABSTRACT: An equation is derived that fits the experimental results of Michels and Wouters (Physica, 8, no. 6, 1941) with a maximum error of 0.04 percent. The paper is divided into two parts: the first deals with potentials and the virial for the internal forces (interactions between molecules). The atom is assumed to be spherical and exerts only central forces (R^{-n}), terms with n = 6 and n = 12 suffice. The second part deals with a revision of the equation given by Michels and Wouters, which does not fit their results. The revised equation agrees with the results for the ranges 0-150° C and 9-180 Amagat units in density. Original article has: 3 figures, 2 tables, 27 formulas.

ASSOCIATION: Moscow St. Un.

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PREDVODITELEV, A.S.

Modern theory of space and time. Part 1: Geometric space. Ist. i method. est. nauk 2:3-94 '63. (MIRA 16:11)

L 13148-63 EWT(1)/BDS AFFTC/ASD

S/170/63/000/004/017/017

AUTHOR: Predvoditelev, A. S.

TITLE: On critical phenomena of liquids and gases

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 6, no. 4, 1963, 123-133

TEXT: In this survey article, the author discusses these phenomena under two headings: 1) General characteristics of the critical state of liquids and gases based on experimental data; and 2) Equation of the line of existence of a liquid and its vapor in thermodynamic equilibrium. He derives numerous formulas for the states of matter. Cardan equations and trigonometric transformations are used to derive values for various substances: ethyl acetate, acetic acid, heptane, pentane and methyl alcohol. These values are given in tabular form, together with specific densities and temperatures of the matter. The adduced concept relating to an interpretation of critical state does not contradict experimental results; at the same time, it eliminates the need of seeking a unified equation of state equally suitable for describing the properties of liquid and its vapor. There is 1 table.

ASSOCIATION: Gosudarstvennyy universitet imeni M. V. Lomonosova (Moscow) [Moscow] State University im. M. V. Lomonosova

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PREDVODITELEV, A.S.

Kinematics of statistical motions. Inzh.-fiz. zhur. 6 no.9:87-96 S '63. (MIRA 16:8)

1. Gosudarstvennyy universitet imeni M.V. Lomonosova, Moskva.

PREDVODITELEV, A.S.

Equations of state of carbon monoxide and carbon dioxide. Inzh.-fiz. zhur. no.12:101-106 D '63. (MIRA 17:2)

1. Gosudarstvennyy universitet imeni Lomonosova, Moskva.

PREDVODITELEV, A.S., prof., otv. red.

[Physical gas dynamics. Properties of gases at high temperatures] Fizicheskaia gazodinamika. Svoistva gazov pri vysokikh temperaturakh. Moskva, Izd-vo "Nauka," 1964. 220 p. (MIRA 17:6)

1. Moscow. Energeticheskiy institut imeni G.M. Krzhizhanovskogo. 2. Chlen-korrespondent AN SSSR (for Predvoditelev).

PREDVODITELEV, A.S.

Equations of state for xenon and methane. Inzh.-fiz. zhur. 7 no.1: 93-97 Ja '64. (MIRA 17:2)

1. Gosudarstvennyy universitet imeni Lomonosova, Moskva.

L 20816-65 EWT(1) AFWL/ASD(a)-5/AEDC(a)/SSD/ASD(f)-3/ASD(p)-3/AFETR/ESD(gs)/ESD(t) MLK

ACCESSION NR: AT4048021 S/0000/64/000/000/0177/0196

AUTHOR: Predvoditelev, A.S. (Corresponding member AN SSSR, Professor)

TITLE: The general theory of wave processes

SOURCE: AN SSSR. Energeticheskiy institut. Fizicheskaya gazodinamika i svoystva gazov pri vy* sokikh temperaturakh (Physical gas dynamics and properties of gases at high temperatures). Moscow, Izd-vo Nauka, 1964, 177-196

TOPIC TAGS: wave analysis, wave propagation, Huygens principle, refraction, Snell law, Monge theory, gas dynamics

ABSTRACT: The author considers the general theory of wave propagation based on Huygens' principle, commencing with the apparent paradox that the wave propagates only in the forward direction. He shows that the question of direction of wave propagation depends on the relationship between displacements and velocities. The conditions for unidirectional propagation of a wave along a string are then considered. For a unique wave-front existing for a finite period of time, conditions are imposed on the existence of discontinuities in the partial derivatives. Hadamard suggested an identity governing discontinuities for two regions separated by the wave front. Hugionot and Hadamard

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showed that the condition of continuity could be used to obtain relationships connecting the rate of propagation of the wave front and basic physical parameters characterizing the medium, both real and imaginary. The author then sketches Monge's theory of characteristics from the point of view of the general theory of surfaces, in its connection with wave-fronts. It is desirable to know how the continuity conditions change when there are discontinuities of a variable in front of a shock wave. This leads to a rewording of Hadamard's postulate to give generalized continuity conditions. He notes that these conditions are also used in closed form in quantum mechanics. It is the author's contention that many problems in gas dynamics, currently solved in terms of boundary conditions, could be more fully treated using the ideas of Hugionot and Hadamard. He then considers reflection and refraction of a wave front using their relations and derives Snell's law for refraction as a special case of reflection. Orig. art. has: 3 figures and 26 equations.

ASSOCIATION: Energeticheskiy institut AN SSSR (Power Engineering Institute, AN SSSR)

SUBMITTED: 06Mar64 ENCL: 00 SUB CODE: OP, ME

NO REF SOV: 003 OTHER: 003

SALAMANDRA, Genriyetta Davydovna; PREDVODITELEV, A.S., otv. red.

[High-speed photography by the Schlieren method] Vysokoskorostnaia s"emka shliren-metodom. Moskva, Nauka, 1965. 71 p. (MIRA 18:8)

1. Chlen-korrespondent AN SSSR (for Predvoditelev).

L 24077-66 EWT(l)/EWP(m)/EWT(m)/EWA(d)/T/EWA(h)/EWA(l) JKT/WW/JW/JWD/WE/JT
ACC NR: AP6011966 SOURCE CODE: UR/0281/65/000/002/0158/0159

AUTHOR: Alad'yev, I. T.; Aleksandrov, B. K.; Baun, V. A.; Golovina, Yo. S.; Gol'denberg, S. A.; Zhimerin, D. G.; Zakharin, A. G.; Iyevlev, V. N.; Knorre, V. G.; Kozlov, G. I.; Loont'yeva, Z. I.; Markovich, I. M.; Meyerovich, E. A.; Mikhnovich, G.V.; Popkov, V. I.; Popov, V. A.; Predvoditelev, A. S.; Pyatnitskiy, L. N.; Styrikovich, M. A.; Tolstoy, Yu. G.; Tsukhanova, O. A.; Chukhanov, Z. F.; Sheyndlin, A. Ye.

ORG: none

TITLE: Lev Nikolayevich Khitrin

SOURCE: AN SSSR. Izvestiya. Energetika i transport, no. 2, 1965, 158-159

TOPIC TAGS: academic personnel, physics personnel, combustion, carbon, high temperature research, plasma beam, fuel

ABSTRACT: Professor L. N. Khitrin, Corresponding Member, Academy of Sciences USSR, State Price Laureate, and Doctor of Engineering Sciences, died after a short but severe illness at the age of 58. He was well known here and abroad as an outstanding scientist and specialist in the field of combustion theory and the development of methods for speeding up burning of fuel. He began his scientific work at the All-Union Heat Engineering Institute after graduating from the physics department of Moscow University in 1930. His early work was on the propagation of flames in gases, and on heterogenous combustion. In 1948 he defended his Doctor's Dissertation on the theory of combustion of car-

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bon. His monograph "Combustion of Carbon" was awarded the State Prize in 1950. In 1951 he became the permanent director of the laboratory for the intensification of combustion processes of the G. M. Krzhizhanovskiy Power Institute. He was elected a corresponding member of the Academy of Sciences USSR in 1953. He headed the All Union Advisory Board on combustion, represented Soviet science at International Symposia, and was a member of the International Institute of combustion. For a number of years, he directed the Moscow general seminar on combustion, and took an active part in the work of the Scientific Council of the Academy of Sciences USSR, on high temperature heat physics, and of the scientific council on the comprehensive utilization of fuel. He devoted a large amount of attention to teaching work. He directed the Combustion Division of the Physics Department of Moscow State University. His monograph "Physics of Combustion and Explosion" (1957) is a basic text for students in this field. Three Doctor's Dissertations and fifteen Candidate Dissertations were defended under his direction. In the last years of his life he directed work on methods for comprehensive utilization of fuel at power stations so as to obtain valuable products from the mineral part of the fuel, as well as work on the physical chemical processes in a plasma stream, and the mechanism of interaction between carbon and gases. He was the author of more than 60 scientific works, for which he was awarded the Order of the Red Banner of Labor and medals. Orig. art. has: 1 figure. [JPRS]

SUB CODE: 21, 20 / SUBM DATE: none

Card 2/2

ALAD'YEV, I.T.; ALEKSANDROV, B.K.; BAUM, V.A.; GOLOVINA, Yo.S.; GOL'DENBERG, S.A.; ZHIMERIN, D.G.; ZAKHARIN, A.G.; IYEVLEV, V.N.; KNORRE, V.G.; KOZLOV, G.I.; LEONT'YEVA, Z.I.; MARKOVICH, I.M.; MEYEROVICH, E.A.; MIKHNEVICH, G.V.; POPKOV, Z.I.; POPOV, V.A.; PREDVODITELEV, A.S.; PYATNITSKIY, L.N.; STYRIKOVICH, M.A.; TOLSTOV, Yu.G.; TSUKHANOVA, O.A.; CHUKHANOV, Z.F.; SHEYNDLIN, A.Ye.

Lev Nikolaevich Khitrin, 1907-1965; obituary. Izv. AN SSSR. Energ. i transp. no.2:159-160 Mr-Ap '65. (MIRA 18:6)

PREDVODITELEV, A.S.

Mathematical calculation and our knowledge. Ist. i metod. est. nauk no.3:13-152 '65. (MIRA 18:12)

BAZAROV, I.P.; GERASIMOV, Ya.I.; KISELEV, A.V.; PREDVODITELEV, A.S.; RADUSHKEVICH, L.V.; SKURATOV, S.M.; TIRLFTSKIY, N.P.; CHMUTOV, K.V.; SHUBNIKOV, A.V.; SHULEYKIN, V.V.

Vladimir Ksenofontovich Semenchenko, 1894- ; on his 70th birthday. Zhur. fiz. khim. 39 no.5:1300-1301 My '65. (MIRA 18:8)

ACC NR: AT7000289 SOURCE CODE: UR/3142/60/150/007/0009/0014

AUTHOR: Predvoditelev, A. S.

ORG: None

TITLE: On combustion of spherical particles

SOURCE: Odessa. Universitet. Trudy, v. 150. Seriya fizicheskikh nauk, no. 7, 1960. Voprosy ispareniya i goreniya v dispersnom vide (Problems of evaporation and combustion in the dispersed state), 9-14

TOPIC TAGS: combustion kinetics, solid fuel, liquid fuel, fuel ignition, forced flow, vaporization

ABSTRACT: The author discusses the combustion front formed by ignition of a liquid drop vaporized in a forced flow. It is shown that if the angle of separation during combustion of the drop is constant, then the combustion process conforms to Sreznevskiy's rule, i. e. the surface of the drop varies linearly with time. Combustion of spherical carbon particles is also considered. A comparison of theoretical and experimental data shows that combustion of spherical electrode carbon particles also conforms to Sreznevskiy's rule, i. e. combustion takes place frontally. A formula is derived for the velocity of the combustion front in terms of the radius of the particle. An analysis of the data presented in the paper gives the following picture for combustion of two-phase mixtures. A combustion zone forms around the particle

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before it is exposed to the oxidizer. The inner surface of this zone coincides with the isothermal surface corresponding to the flash point. This surface is located a certain distance from the vaporizing surface of the drop, determined by equality between the velocities of the isothermal and diffusion isoconcentration surfaces. If a gas flow is superimposed on this process, the isothermal surface of the combustion zone will be distorted by the laws for heat propagation in gas flows. The combustion zone is separated by an increase in velocity and hangs over the drop like a parachute. A further increase in velocity results in incombustibility of the drop. In a system of drops with dimensions which are small compared with the average distances between them, the combustibility of the mixture is determined by the maximum relative velocities of the drop at which "parachuting" combustion is possible. Flow turbulence does not change this pattern significantly, and in fact promotes parachuting combustion. Orig. art. has: 5 figures, 1 table, 7 formulas.

SUB CODE: 21/ SUBM DATE: None/

Card 2/2

ACC NR: AT7000296 SOURCE CODE: UR/3142/60/150/007/0075/0083

AUTHOR: Predvoditelev, A. S.

ORG: None

TITLE: On the rate of displacement and propagation of the combustion front in two-phase mixtures

SOURCE: Odessa. Universitet. Trudy, v. 150. Seriya fizicheskikh nauk, no. 7, 1960. Voprosy ispareniya i goreniya v dispersnom vide (Problems of evaporation and combustion in the dispersed state), 75-83

TOPIC TAGS: combustion kinetics, liquid fuel, combustion instability

ABSTRACT: A general theory is proposed for calculating the rate of displacement of the combustion front in two-phase fuel mixtures. It is found that conditions exist where the rate of frontal displacement is independent of air excess. A formula is derived which may be used as a criterion in studying combustion instability in two-phase mixtures. While all quantities accounted for in the theory may be directly measured in principle, only a few disconnected observations have been made, which obviates an overall picture of the phenomenon and affords only qualitative experimental verification. On the other hand, the theory has not been contradicted by existing experimental material. Orig. art. has: 18 formulas.

SUB CODE: 21/ SUBM DATE: None

Card 1/1

SOURCE CODE: UR/3142/60/150/007/0097/0109

ORG: None

Predvoditelev, A. S.

TITLE: On the frontal process of vaporization and sublimation of spherical particles

SOURCE: Odessa. Universitet. Trudy, v. 150. Seriya fizicheskikh nauk, no. 7, 1960. Voprosy ispareniya i goreniya v dispersnom vide (Problems of evaporation and combustion in the dispersed state), 97-109

TOPIC TAGS: vaporization, sublimation, combustion kinetics

ABSTRACT: The author considers combustion of heterogeneous systems and discusses a new approach to a solution of the problem of liquid vaporization from a free surface. Conditions are defined which favor sublimation of a solid particle or vaporization of a liquid drop in a quiescent gaseous medium. It is shown that the process takes place frontally only when the vaporization surface unites with the isothermal surface. Vaporization of spherical particles in flows is also considered. It is shown that vaporization of a spherical particle takes place from the leading and trailing edges with a constant hemispherical curvature. The radius of curvature of the trailing edge of the sphere is always greater than that of the leading edge. During vaporization, the centers of curvature move to the right and left at different velocities.

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SUB CODE:

Card 2/2

ACC NR: AT7000294 SOURCE CODE: UR/3142/60/150/007/0045/0054

AUTHOR: Predvoditelev, A. S.; Sundukov, I. N.

ORG: None

TITLE: Flame propagation in two-phase mixtures

SOURCE: Odessa. Universitet. Trudy, v. 150. Seriya fizicheskikh nauk, no. 7, 1960. Voprosy ispareniya i goreniya v dispersnom vide (Problems of evaporation and combustion in the dispersed state), 45-54

TOPIC TAGS: flame propagation, combustion kinetics, combustion chamber

ABSTRACT: The authors discuss one of the possible concepts of combustion of two-phase mixtures as a basis for a theoretical explanation of phenomena which take place in engine combustion chambers. Ignition of two-phase mixtures was studied with the help of the special vaporizing injection precombustion unit shown in the figure. Gasoline injected through atomizer *6* is directed by a jet of air against spherical deflector *5* to produce a finer fuel spray. The air and atomized fuel are mixed and fed to spray burner *1* 13.3 mm in diameter. There the air is continuously ignited by gas-oxygen ignition source *2*. Needle valve *7* is used for fuel flow regulation. Electric heater *3* surrounding the mixing chamber is used to control the amount of liquid phase in the mixture from 60% to zero. The lower section of the precombustion unit is made from

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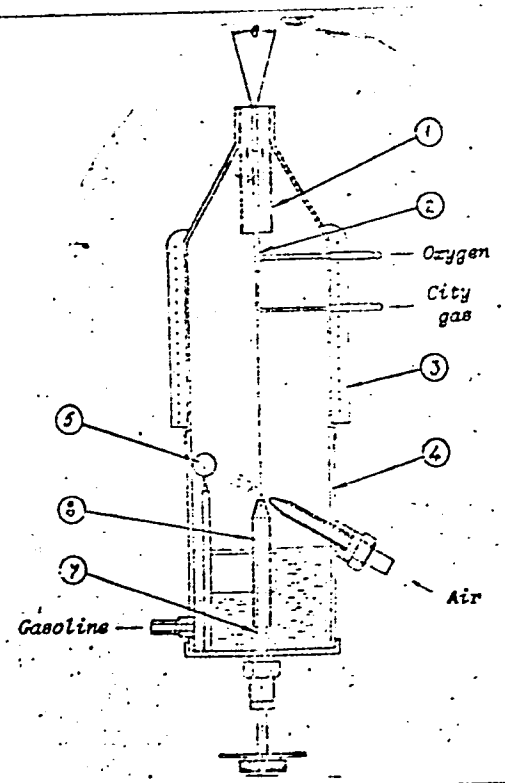
ACC NR: AT7000294

plexiglass and graduated to show the amount of fuel consumed in a unit of time. A special device was used for determining the ratio of liquid phase to the total quantity of gasoline in the mixture with an error of 12%. The rate of flame propagation was determined from the apex angle θ microscopically measured on a considerable number of photographs, according to the formula $g=W\sin(\theta/2)$ where W is the average velocity of the mixture and g is the rate of motion of the flame. Formulas are derived for g in terms of time, temperature, distance between the drops in the fuel mixture and the surface area of the fuel particles.



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ACC NR: AT7000294

These formulas may be extended to turbulent combustion of homogeneous mixtures.
Orig. art. has: 3 figures, 13 formulas.

SUB CODE: 21/ SUBM DATE: None

Card 3/3

PREDVODITELEVA, L. S.

PREDVODITELEVA, L. S. --"Investigation of Transformation of Ortho and Paranitrotoluols in Alkaline Media." *(Dissertations for Degrees in Science and Engineering Defended at USSR Higher Educational Institutions) Ministry of Health Protection USSR, All-Union Sci Res Chemicopharmaceutical Inst imeni -, Ordzhonikidze (VNIKhFI), Moscow, 1955

SO: Knizhnaye Letopis', No. 25, 18 Jun 55

* For Degree of Candidate in Chemical Sciences

PREDVODITELEVA, G.S.

Transformations of *o*- and *p*-nitrotoluenes in alkaline medium. M. N. Shchukina and G. S. Predvoditeleva (S. Ordzhonikidze All-Union Chem. Pharm. Sci. Res. Inst., Moscow). *Doklady Akad. Nauk S.S.S.R.* 110, 230–3(1956); cf. Ger. 88,874; Plisov, *C.A.* 24, 1108.—While basic treatment of *o*-$MeC_6H_4NO_2$ (I) results in reactions probably proceeding through intermediates of an anthranil type, the *p*-isomer must form similar polymeric intermediates. I in NaOH with S should yield *o*-$H_2NC_6H_4CHO$. The reaction yields 14% of this aldehyde and some *o*-$MeC_6H_4NH_2$. If the soln. of S in NaOH is added to the mixt. only after I had been refluxed with 20% aq. alc. NaOH for several hrs., there is obtained 15% 2-indazylbenzyl alc. Anthranil with S and NaOH gave anthranilic acid and *o*-$H_2NC_6H_4CHO$; phenyl-*N*-phenylnitrone gave PhCH:NPh, while *p*-nitrophenyl-*N*-*p*-tolylnitrone gave *p*-$MeC_6H_4NH_2$ and an anhydropolymer of *p*-$H_2NC_6H_4CHO$. The red substance formed from *p*-$MeC_6H_4NO_2$ and NaOH is chemically inert to acids, bases, and oxidation-reduction reagents; its spectrum (infrared) does not have the bands typical of N—O group of nitrones (butyl-*N*-methylnitrone and *N*-oxides of pyridine and Me_3N show intense bands at 1185–1250 cm.$^{-1}$ and 920–950 cm.$^{-1}$); hence the groups which connect the polymer links are not nitrone groups but probably amide links. This is confirmed by the fact that *p*-nitrophenyl-*N*-*p*-tolylnitrone treated with aq. alc. NaOH gave a very inert polymer, which with piperidine gave *p*-nitrobenzo-*p*-toluidide, which indicates that the initially formed nitrone undergoes under the action of alkali, a rearrangement of the Beckmann type, forming a *p*-linked polyamide. I with NaOH may be represented by formation of unstable lactam from the initially formed anthranil; the latter gives rise to a variety of products depending on the subsequent treatment. G. M. Kosolapoff

PREDVODITELEVA, G.S.; SHCHUKINA, M.M.

Synthesis of S^{35}-aminazine. Khim. i med. no.11:34-39 '59. (MIRA 13:6)

(CHLORPROMAZINE)

PREDVODITELEVA, G.S.; SHCHUKINA, M.N.

New variant of diacarb synthesis. Med.prom. 13 no.9:24-26 S '59.
(MIRA 13:1)

1. Vsesoyuznyy nauchno-issledovatel'skiy khimiko-farmatsevticheskiy institut imeni S. Ordzhonikidze.
(THIADIAZOLE SULFONAMIDE)

PREDVODITELEVA, G.S.; SHCHUKINA, M.N.

Studies in the phenoxazine series. Part 2: Synthesis of some derivatives of substituted 1-phenoxazinecarboxylic acid. Zhur.ob.khim. 30 no.6:1893-1897 Je '60. (MIRA 13:6)

1. Vsesoyuznyy nauchno-issledovatel'skiy khimiko-farmatsevticheskiy institut imeni S. Ordzhonikidze.
(Phenoxazine) (Phenoxazinecarboxylic acid)

PREDVODITELEVA, G.S.; SHCHUKINA, M.N.

Synthesis of benzomorpholine derivatives. Part 3: N-substituted benzomorpholine-2-carboxylic acid derivatives. Zhur. org. khim. 1 no.7:1328-1330 Jl '65. (MIRA 18:11)

PREDVODITELEVA, G.S.; PODZOROVA, Ye.A.; SHCHUKINA, M.N.

Synthesis of benzomorpholine derivatives. Part 4: Nitration of benzomorpholine-2-carboxylic acid derivatives. Zhur. org. khim. 1 no.7:1330-1334 Jl '65. (MIRA 18:11)

SHCHUKINA, M.N.; GOLOMBIK, L.S. [deceased]; PREDVODITELEVA, G.S.

Synthesis of analogs of antipyrine and pyramidon. Zhur. ob. khim. 34 no. 5:1605-1608 My '64. (MIRA 17:7)

1. Vsesoyuznyy nauchno-issledovatel'skiy khimiko-farmatsevticheskiy institut imeni Ordzhonikidze.

PREDVODITELEVA, G.S.; SHCHUKINA, M.N.

Synthesis of derivatives of benzomorpholine. Part 2: N-substituted amides and thioamides of 2-benzomorpholinecarboxylic acid. Zhur. ob.khim. 33 no.12:3975-3978 D '63. (MIRA 17:3)

PREDVODITELEVA, G. S.; SHCHUKINA, M. N.

Synthesis of derivatives of benzomorpholine. Part 1. Zhur. ob. khim. 33 no.1:145-150 '63. (MIRA 16:1)

(Bezoxazine)

PREDVODITELEVA, G.S.; SHCHUKINA, M.N.

Phenoxazine series. Part 5: 2-Aminophenoxazine and other 2-substituted derivatives of phenoxazine. Zhur. ob. khim. 32 no.1:113-117 Ja '62. (MIRA 15:2)

1. Vsesoyuznyy nauchno-issledovatel'skiy khimiko-farmatsevticheskiy institut imeni S.Ordzhonikidze.
(Phenoxazine)

PREDVODITELEVA, G.S.; SHCHUKINA, M.N.

Phenoxazine series. Part 4: Acyl derivatives of phenoxazine and 1-carbethoxy-3-aminophenoxazine. Zhur.ob.khim. 31 no.5:1497-1500 My '61. (MIRA 14:5)

1. Vsesoyuznyy nauchno-issledovatel'skiy khimiko-farmatsevticheskiy institut imeni S.Ordzhonikidze.
(Pyrazole) (Nitrile) (Sydnone)

PHASE I BOOK EXPLOITATION SOV/5698

Akademiya nauk SSSR. Energeticheskiy institut.

Fizicheskaya gazodinamika i teploobmen (Physical Gas Dynamics and Heat Exchange) Moscow, 1961. 112 p. Errata slip inserted. 4,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Energeticheskiy institut im. G. M. Krzhizhanovskogo.

Resp. Ed.: A. S. Predvoditelev, Corresponding Member, Academy of Sciences USSR; Ed. of Publishing House: S. L. Orpik; Tech. Ed.: S. P. Golub'.

PURPOSE : This book is intended for engineers and scientific workers interested in supersonic flow of gases, aerodynamic heat phenomena, and the dissociation of gases.

COVERAGE: This collection consists of 15 papers written at the Laboratoriya fiziki goreniya Energeticheskogo instituta Akademii

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nauk SSSR (Laboratory of Combustion Physics of the Power Institute of the Academy of Science USSR) on investigations on the physics of gas dynamics and phenomena of heat exchange in supersonic flows. In the field of physical gas dynamics motions of the medium with possible transformations of the substance, not excluding such processes as the thermal ionization of molecules and atoms, are discussed. No personalities are mentioned. References follow most of the articles.

TABLE OF CONTENTS: